



THE COUNCIL OF THE CITY OF BINGHAMTON
STATE OF NEW YORK

Date: August 20, 2014

Sponsored by Council Members: Motsavage, Mihalko, Matzo, Berg, Papastrat

Introduced by Committee: Public Works/Parks and Recreation

RESOLUTION

entitled

A RESOLUTION AUTHORIZING THE MAYOR
TO ENTER INTO AN AGREEMENT WITH I.
KRUGER, INC. FOR A BIOSTYR PILOT STUDY
AT THE BINGHAMTON-JOHNSON CITY
JOINT SEWAGE TREATMENT PLANT
(BJCJSTP)

WHEREAS, the City of Binghamton (the "City") is a joint owner of the Binghamton-Johnson City Joint Sewage Treatment Plant (the "JSTP") with the Village of Johnson City (the "Village"); and

WHEREAS, the City and Village entered into Intermunicipal Agreement No. VIII designating the City as "Lead Agency" for the Phase III Remedial Project; and

WHEREAS, the Commissioner of Public Works has recommended the approval of a BIOSTYR Biologically Aerated Filter (BAF) Process Pilot Study by I. Kruger, Inc. in order to investigate performance, provide operational data and to develop treatment experience with the BIOSTYR system at an estimated cost of \$174,000.00 for the first six (6) months and at a cost of \$6,500.00 for each week thereafter; subject to potential reductions in cost based on operations, in accordance with the attached proposal; and

WHEREAS, funding for such Pilot Study is available from budget line J8130.54410.J0BAF (Professional Services – BAF Remediation).

NOW, THEREFORE, the Council of the City of Binghamton, duly convened in regular session, does hereby:

RESOLVE that the Mayor, or his designee, is hereby authorized to enter into an agreement, approved as to form and content by the Office of Corporation Counsel, with I. Kruger, Inc. for a BIOSTYR Biologically Aerated Filter (BAF) Process Pilot Study at a cost not to exceed \$174,000.00 for the first six (6) months and at a cost of \$6,500.00 for each week thereafter; subject to potential reductions in cost based on operations, in accordance with the attached proposal; and be it further

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RESOLVED that such funds shall be deducted from budget line J8130.54410.J0BAF
(Professional Services – BAF Remediation).

I HEREBY CERTIFY that the above described
funds are unencumbered and available.



Chuck Shager, Comptroller/JSB Fiscal Officer

I hereby certify the above to be a true copy
of the legislation adopted by the Council
of the City of Binghamton at a meeting
held on 8/10/14. Approved by the
Mayor on 8/11/14.



Introductory No. R14-55

Permanent No. R14-54

Sponsored by City Council Members:
Motsavage, Mihalko, Matzo, Berg, Papastrat

A RESOLUTION AUTHORIZING THE MAYOR TO
ENTER INTO AN AGREEMENT WITH I. KRUGER,
INC. FOR A BIOSYR PILOT STUDY AT THE
BINGHAMTON-JOHNSON CITY JOINT SEWAGE
TREATMENT PLANT (BJCJTF)

The within Resolution was adopted by the Council of
the City of Binghamton.

Date August 20, 2014

City Clerk Jany Pelletier

Date Presented to Mayor August 21, 2014

Date Approved 8-21-14

Michael C. Stand
Mayor

	Ayes	Nays	Abstain	Absent
Motsavage	✓			
Mihalko	✓			
Rennia				✓
Webb	✓			
Papastrat	✓			
Matzo	✓			
Berg				✓
Total	5	0	0	2

☐ Code of the City of Binghamton

☒ Adopted ☐ Defeated

5 Ayes 0 Nays 0 Abstain 2 Absent



July 18, 2014

Catherine P. Young
Superintendent – Environmental Protection and Control
Binghamton-Johnson City Joint Sewage Treatment Facilities
4480 Vestal Rd.
Vestal, NY 13850
607-729-2975

Re: BIOSTYR Pilot Study Proposal
Binghamton-Johnson City Joint Sewage Treatment Plant

Dear Ms. Young,

Kruger is pleased to offer the following pilot proposal for the BIOSTYR® Biologically Aerated Filter (BAF) process. This proposal summarizes setup requirements for the pilot unit and includes an agreement for the cost of pilot testing.

As per the attached documents, the equipment rental cost for pilot testing BIOSTYR® is \$6,500 per week excluding transportation and third party analytical lab fees. This cost includes a pilot plant specialist onsite to operate the pilot unit Monday – Friday. The transportation of the BIOSTYR pilot unit is \$5,000. Total cost of a six month pilot study plus transportation is \$174,000. If additional weeks are anticipated or needed, we will extend the rental at a rate of \$6,500 for each additional week.

Please note that, as a biological system, the pilot unit will require operations oversight on the weekends in addition to the weekdays. We anticipate that weekend operations and maintenance of the pilot system as a whole will be provided by your operations staff, with the exception of the first 2 weekends of operation. During the initial weeks Kruger will train your staff to allow them to operate the system without a Kruger field engineer present. We understand that this training should be sufficient for your staff to provide the majority of the operations during the week as well, and that Kruger field service (and thus the weekly rental fee) could be reduced significantly as a result. Accordingly, Kruger will reduce the rental fee by \$4,500 for each week that Kruger is not onsite.

We look forward to discussing the pilot operation plan in detail with you and your staff. If you have any questions on this package, or other requirements for preparation, please do not hesitate to contact me at (919) 653-4572.

Sincerely,

By email

Drew Bostian
Pilot Group Manager

I. Kruger Inc. • 4001 Weston Parkway • Cary, North Carolina 27513
Phone (919) 677-8310 • Fax (919) 677-0082



DEMONSTRATION TEST AGREEMENT

THIS DEMONSTRATION TEST AGREEMENT (this "Agreement") is made as of the 18th day of July 2014, by and between I. Kruger Inc., Cary, North Carolina ("KRUGER") and Binghamton-Johnson City Joint Sewage Treatment Authority ("Customer").

1. KRUGER has submitted to the Customer, dated July 18, 2014 (the "Proposal", a copy of which is appended hereto as Attachment A and incorporated herein by reference) concerning the use of a mobile BIOSTYR Biological Aerated Filter (BAF) Pilot Unit (the "Unit") at Binghamton-Johnson City Joint Sewage Treatment Plant located in Binghamton, NY (the "Facility"), and Customer desires to accept the Proposal on the terms and conditions herein set forth.
2. KRUGER shall at all times maintain ownership of the Unit, but shall make the Unit available at the Facility for approximately a 6 month period, mutually acceptable to KRUGER and the Customer, for the completion of a demonstration test (the "Demonstration") as described in the Proposal. The Customer shall provide, at its sole cost and expense, the personnel, services and other support items necessary for completion of the Demonstration, as described in the Proposal. In consideration for making the Unit available for the Demonstration, the Customer shall pay to KRUGER the sums set forth in the Proposal.
3. KRUGER'S provision of the Unit for completion of the Demonstration shall be subject to all of the terms and conditions set forth in Attachment B hereto, each of which are incorporated by reference as if fully set forth herein. The provisions of Attachment B shall survive the expiration or earlier termination of this Agreement. Initially capitalized words and phrases used in Attachment B without definition shall have the meanings ascribed to such words and phrases in this Agreement.
4. This Agreement may be executed in two or more counterparts, each of which shall be deemed to be an original, but all of which together shall be deemed to be one and the same instrument. Any written notice or other written information to be communicated pursuant to or in connection with this Agreement shall be delivered by reputable overnight courier or certified mail, return receipt requested, to the addresses appearing on the signature page of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused their duly authorized representatives to execute and deliver this Agreement as of the day and year first above written.

Customer Legal Name	I. Kruger Inc. d/b/a KRUGER
By: _____	By: _____
Print Name: _____	Print Name: _____
Title: _____	Title: _____
Address: _____	Address: 4001 Weston Parkway Cary, NC 27513



ATTACHMENT A

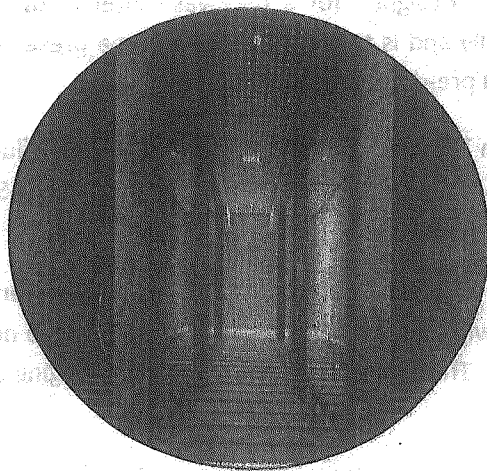
BIOSTYR Biological Aerated Filter Pilot Concept Description

For the

Binghamton-Johnson City

Joint Sewage Treatment Facilities

Vestal, NY



The information or data contained in this proposal is proprietary to Kruger and should not be copied, reproduced, duplicated, or disclosed to any third party, in whole or part, without the prior written consent of Kruger. This restriction will not apply to any information or data that is available to the public generally.

July 18, 2014

I. Kruger Inc. • 4001 Weston Parkway • Cary, North Carolina 27513
Phone (919) 677-8310 • Fax (919) 677-0082



1.0 Introduction

A BIOSTYR® demonstration unit will be used to carry out the pilot study at the Binghamton-Johnson City Joint Sewage Treatment Facility. The purpose of the pilot study will be to investigate performance, provide operational data and develop treatment experience with the BIOSTYR® process.

2.0 BIOSTYR Process Description

The BIOSTYR system is an up-flow submerged fixed-film filter that biologically treats carbonaceous and nitrogenous wastes (CBOD, $\text{NH}_4\text{-N}$, $\text{NO}_3\text{-N}$) and removes insoluble pollutants (TSS) through the filtering mechanism of the process. The influent wastewater is first pumped to a common inlet feed channel above the BIOSTYR cells where it flows down to the individual cells by gravity. Upon entering the BIOSTYR cells, the wastewater is forced upwards through the filter media. The media contained in the cells is composed of specially manufactured high-density polystyrene beads covered by active biomass. This active biomass provides biological treatment to the wastewater as it flows through the cells. Ceiling plates with regularly spaced nozzles are used to retain the filter media. The nozzles allow the treated water to enter a common water reservoir above the filters, which in turn is used to provide water during backwash sequences. AnoxKaldes™ Moving Bed Biofilm (MBBR) media can be placed below the BIOSTYR filter bed to increase the pollutant loading and removal capacity of the filter with regards to organics and particulates.

Growth of biomass and the retention of suspended solids in the filter media make periodic backwashing necessary. The BIOSTYR process is designed for a backwash interval of 24 hours or more. The backwash sequence is performed automatically and is triggered either when a preset time limit has expired or when the head loss across the filter exceeds a pre-determined set-point.

Like other filtration processes, high TSS and BOD concentrations in the influent waste stream can increase the rate of clogging. If the influent waste stream contains high levels of TSS or BOD, it is desirable to install clarification to partially treat the wastewater.

The BIOSTYR process provides several significant improvements over other fixed film systems. First, using a floating media bed in conjunction with an up-flow system ensures that the nozzles used to retain the media are only in contact with treated water. This prevents the nozzles from clogging and provides easy access for nozzle maintenance or replacement.

Second, the counter-current backwashing sequence ensures efficient removal of accumulated solids. During backwashing sequences, the downward flow expands the filter media and utilizes gravity to aid in flushing solids from the bottom of the filter. Additionally, the backwash water is supplied from a common reservoir above the filter cells, eliminating the costs associated with backwash pumping. Finally, used backwash water is collected in drainpipes at the bottom of the filters. It is not exposed to the atmosphere, so the potential for odor problems is dramatically reduced.



3.0 Pilot Study Protocol

The key objectives, operational plan, schedule, and analytical sampling plan are defined in the following section.

3.1 Objectives

The primary goals of this demonstration study are:

1. To establish maximum carbon and nitrogen loading rates in the BIOSTYR DUO configuration while achieving and maintaining stable nitrification to effluent $\text{NH}_4\text{-N}$ concentrations of $< 1.0 \text{ mg/L}$.
2. To establish maximum nitrogen loading and removal rates using a pre-anoxic BIOSTYR filter for denitrification in a two stage MLE type configuration.

The two primary goals shall be explored in two separate pilot stages. The first stage shall focus on the operation of one BIOSTYR tower operating as an aerobic BIOSTYR DUO. The second stage of the pilot study shall incorporate a second tower upstream of the aerobic tower for pre-anoxic operation.

3.2 Pilot System Configuration and Setup

The BIOSTYR pilot unit is comprised of two independent BAF towers installed on skids. Some ancillary equipment is installed with the towers including feed pumps, backwash pumps, compressor, and a controls shed with a PLC panel, motor starters, VFD's, and SCADA system. The panel shall serve to accept the main power feed to the unit, provide power to most Kruger-supplied equipment, and send/monitor control signals to/from the equipment.

Phase I shall consist of operating one tower as an aerobic BIOSTYR DUO. The Phase I system shall consist of the following equipment provided by Kruger:

1. Aerobic BIOSTYR DUO Feed Pump
2. Aerobic BIOSTYR DUO Tower
3. Aerobic BIOSTYR DUO Effluent Storage Tank (~2,000 gal)
4. BIOSTYR Backwash Waste Tank (~1,000 gal)
5. Aerobic BIOSTYR DUO Backwash Pump
6. Aerobic BIOSTYR DUO Control Valves, Instruments, Compressor and Controls Shed

Phase II shall consist of bringing a second BIOSTYR tower into anoxic operation upstream of the already operating aerobic BIOSTYR DUO tower. The nitrate rich effluent from the aerobic tower will be recirculated and mixed with influent to the anoxic tower for pre-denitrification. The effluent of the anoxic tower will then flow into the aerobic tower to oxidize BOD and NH_4 .

The Phase II system shall consist of the following equipment provided by Kruger:

1. Anoxic BIOSTYR Feed Pump

I. Kruger Inc. • 4001 Weston Parkway • Cary, North Carolina 27513
Phone (919) 677-8310 • Fax (919) 677-0082



2. Anoxic BIOSTYR Tower
3. Anoxic BIOSTYR Tower Effluent Storage Tank (~2,000 gal)
4. Nitrified Effluent Recirculation Pump
5. Anoxic BIOSTYR Backwash Pump
6. Anoxic BIOSTYR Control Valves and Instruments

3.3 Pilot Study Stages

The pilot study shall consist of the following seven (7) general phases:

- **Phase 1: Installation**

During this phase, equipment shall be shipped to the site and erected into the process configuration. While the beginning of the test only requires the use of one tower, both towers shall be set up from the start. Assistance from the city shall be required to raise the towers to a standing position and position the larger pieces of equipment. Following tower erection, tanks and pumps shall be plumbed, and all electrical work shall be performed by a certified electrician. See Pilot Setup Summary Section 4.7 for a list of setup responsibilities.

- **Phase 2: System Check-Out**

When the unit is fully powered and able to process water, Kruger will verify the operation of all BIOSTYR system pumps, valves, compressors and instruments. Any media installation will take place. Automatic refrigerated auto samplers will be put in place for the influent and effluent of the first stage unit.

- **Phase 3: Initial Start-Up and Optimization of BIOSTYR DUO**

Kruger shall start-up the BIOSTYR DUO unit with primary effluent. Kruger will make adjustments to loading rates, backwash frequencies and durations (if required) to obtain acceptable, stable overall performance as defined by low effluent BOD₅ concentrations and a fully nitrified effluent. A Kruger representative shall be onsite M-F during this phase to take readings, analyze samples, make process operating decisions and necessary adjustments.

The primary targeted operating conditions to obtain during the demonstration period will be:

1. 140 lb BOD₅ per 1000 ft³/day
2. 11.9 lbs NH₃-N per 1000 ft³/day
3. Influent average hydraulic flowrate of 7.0 – 8.0 GPM

If the BIOSTYR DUO system can process higher pollutant and/or hydraulic loading, the system shall be operated in such a way to explore the process limitations.

- **Phase 4: Demonstration of BIOSTYR DUO**

In this stage the demonstration unit will be operated continuously at specific hydraulic and pollutant loading rates that are intended to be representative of full scale operation according to Kruger's most



recent design recommendations in place at the time of the demonstration study. During the Demonstration phase, Kruger shall continue to optimize the system to best treat the wastewater to the extent required. The demonstration phase will include detailed data analysis, both conducted in the field by Kruger and at a third party testing laboratory, to evaluate the system performance when treating primary clarified effluent. Operation of the system, including routine O&M, flowrate adjustments, and adjustment of BIOSTYR operating parameters, will be the responsibility of both Kruger and BJC JSB operations staff during the demonstration phase, as agreed. Based on training of the plant staff during the initial startup and optimization Kruger anticipates being able to reduce onsite presence during the demonstration phase. This will be evaluated and a Kruger representative will be onsite during the demonstration phase as needed.

- **Phase 5: Initial Start-Up and Optimization of Anoxic Tower (Pre-DN BISOTYR Tower)**

Kruger shall start-up the anoxic unit with primary effluent and recycled nitrified effluent from the aerobic BIOSTYR DUO tower. Kruger will make adjustments to loading rates, backwash frequencies and durations (if required) to obtain acceptable, stable overall performance as defined by low effluent BOD5 concentrations, a fully nitrified effluent, and low effluent nitrate. A Kruger representative shall be onsite M-F during this phase to take readings, analyze samples, make process operating decisions and necessary adjustments.

The primary targeted operating conditions to obtain during the demonstration period will be:

1. 150 lb BOD₅ per 1000 ft³/day
2. 8.0 lbs NO₃-N per 1000 ft³/day
3. Influent average hydraulic flowrate of 2.5 GPM

- **Phase 6: Demonstration of Pre-DN BIOSTYR Tower**

In this stage the demonstration unit will be operated continuously at specific hydraulic and pollutant loading rates that are intended to be representative of full scale operation according to Kruger's most recent design recommendations in place at the time of the demonstration study. During the Demonstration phase, Kruger shall optimize the system to best treat the wastewater to the extent required. The demonstration phase will include detailed data analysis, both conducted in the field by Kruger and at a third party testing laboratory, to evaluate the system performance when treating primary clarified effluent. Operation of the system, including routine O&M, flowrate adjustments, and adjustment of BIOSTYR operating parameters, will be Kruger's responsibility during the demonstration phase. Based on training of the plant staff during the initial startup and optimization Kruger anticipates being able to reduce onsite presence during the demonstration phase. This will be evaluated and a Kruger representative will be onsite during the demonstration phase as needed.

- **Phase 7: Demobilization**

At the conclusion of the Demonstration phase, Kruger will arrange for the removal of its BIOSTYR pilot equipment.



3.4 Pilot Study Schedule

Installation, system set-up, and equipment checks is anticipated to take approximately 4 weeks. The start-up and optimization of the first pilot study stage is estimated to take approximately 6-8 weeks whereas the start-up and optimization of stage 2 is anticipated to take approximately 4-6 weeks. The demonstration phase of each stage is estimated to occur for approximately 4 weeks. A Kruger representative will be onsite Monday afternoon through Friday morning. The city is responsible for weekend rounds to check correct operation of the system. This will take approximately 15-30 minutes/day provided that no intervention is required to fix incorrect operation.

3.5 Analytical Sampling Plan

Kruger will provide two (2) refrigerated automatic samplers for the demonstration study for obtaining 24 hour composite samples of both the BIOSTYR influent and effluent streams. BOD and TSS composite samples shall be analyzed by the plant lab. Kruger will provide onsite analytical services for the majority of data gathered. In addition to the composite samples some grab samples will also be checked. During each demonstration period, composite samples will also be sent to a third party lab for verification. Tables 1 and Table 2 show a general analytical sampling plan for the pilot study. Depending on pilot stage, grab sampling location and frequency may change for troubleshooting and optimization purposes. It is also anticipated that additional sampling points and 1-2 additional automatic samplers (by Owner) may be required during Phase 6 where both pilot units are operated with nitrate recycle.

Table 1: Weekly On-Site Analytical Sampling Plan

Parameter	Mon	Tues	Wed	Thurs	Fri
BOD (inf/eff)*	2C	-	2C	-	2C
TSS (inf/eff)*	2C	-	2C	-	2C
sCOD (inf/eff)	2C/2G	2C/2G	2C/2G	2C/2G	2C/2G
COD(inf/eff)	2C/2G	2C/2G	2C/2G	2C/2G	2C/2G
NO ₃ -N (eff)	2C/2G	2C/2G	2C/2G	2C/2G	2C/2G
NO ₂ -N (eff)	2C/2G	2C/2G	2C/2G	2C/2G	2C/2G
Alkalinity (eff)	2C/2G	2C/2G	2C/2G	2C/2G	2C/2G
NH ₃ -N (inf/eff)	2C/2G	2C/2G	2C/2G	2C/2G	2C/2G
Ortho-P (inf/eff)	2C	2C	2C	2C	2C

*Analyzed By Plant Laboratory



Table 2: Weekly Outside Lab Analytical Sampling Plan

Parameter	Mon	Tues	Wed	Thurs	Fri
BOD (inf/eff)*	2C	-	2C	-	2C
TSS (inf/eff)*	2C	-	2C	-	2C
NO ₃ -N (eff)	2C	2C	2C	2C	2C
NO ₂ -N (eff)	2C	-	2C	-	2C
Alkalinity (eff)	2C	-	2C	-	2C
NH ₃ -N (inf/eff)	2C	2C	2C	2C	2C
Ortho-P (inf/eff)	2C	-	2C	-	2C

**Analyzed By Plant Laboratory*

4.0 Pilot Setup Requirements & Responsibility

The following section briefly describes the equipment and work scope anticipated for the pilot study.

4.1 Site Access and Installation Requirements

The BIOSTYR two tower system including controls shed and external tanks will need an accessible, flat space of approximately 50 ft x 50 ft. Erection of the BIOSTYR towers will require the use of a crane. Location of other pieces of equipment shall require equipment (forklift, backhoe, etc.) provided by the client. System weights and dimensions shall be provided at a later date.

4.2 Influent Requirements

The BIOSTYR system shall require a maximum of approximately 10 GPM. Kruger will provide a submersible feed pump to deliver primary effluent to the filter towers.

4.3 Effluent Requirements

The BIOSTYR system shall produce an average of 5-10 GPM of effluent, with a maximum flow of approximately 60 GPM following a Backwash. The effluent will flow by gravity to the head of the plant or upstream of the primary clarifier.

4.4 Electrical Requirements

The electrical requirements for the BIOSTYR control panel are 480 volt, 60 Amp. The client shall provide electrical supply cable from BIOSTYR junction box to power supply. Electrical wires and conduit to motors and instruments shall be supplied by the client including a separate 120 V connection for the compressor.



4.5 Weather Protection Requirements

The pilot will require winterization for the cold months including at a minimum shrouding of the pilot towers, pipe insulation, and possible heat tracing(if necessary.) Winterizing the pilot shall be the Client's responsibility, but Kruger will provide guidance to the client in completing the effort.

4.6 Laboratory Requirements

Kruger is responsible for most water quality analysis. Kruger will require a space in the plant laboratory for set-up of a spectrophotometer, pipettes, etc. Approximately 5-6 ft of countertop space and room in a refrigerator for sample and test kit storage is typically sufficient. Kruger will provide the kits/reagents necessary for spectrophotometer based onsite analysis. BOD and TSS analyses will be performed by the plant laboratory as indicated by the sampling schedule.

4.7 Pilot Setup Summary

4.7.1 Equipment and Services Provided by Kruger

- BIOSTYR Pilot Units with equipment per Section 3.2.
- One (1) technician onsite for startup of the unit at the beginning of the testing period and for pilot operation Monday – Friday for the duration of the pilot testing.
- Detailed sampling protocol preparation and final approval.
- A summary of performance data upon completion of the pilot testing.

4.7.2 Equipment and Services Provided by Client

- Assistance (manpower) with unpacking, disassembling, and repacking the pilot unit.
- Crane for loading and unloading equipment.
- 3 phase, 480 Volt/60 Amp electrical service and an electrician to hard wire the power cable to the supply.
- A safe, clean and level surface to operate the pilot filter.
- Installation of all new equipment, shipped loose to the project site.
- All electrical wiring and conduit to connect new devices of each pilot unit to the control shed.
- Test stream to the pilot unit, a flow regulator (if necessary), routing of filtered effluent and backwash discharge lines.
- All sampling and costs for outside independent laboratory analysis.
- Raw water source and influent pipe from raw water source to demonstration unit. (One submersible pump is available from Kruger, but may require special equipment and/or assistance with placement.)
- Influent Pipe and pump cable
- Backwash discharge pipe and storage



- Effluent pipe and storage
- Complete responsibility for, and ownership of, all effluents and backwash disposal from the pilot unit.
- Utilities such as potable water and 480V electricity supply.
- Any necessary winter protection for the pilot unit

4.7.3 Protocol, Data, and Visitation

- Both the client and Kruger must agree upon pilot study protocol prior to the start of the pilot study.
- Kruger reserves the right to receive data collected by the client/engineer or Kruger, including pilot filter operating conditions and laboratory samples. All data shall be shared between the client/engineer and Kruger at the time that the data is collected or becomes available.
- Kruger reserves all rights for this data. The data must not be distributed without the written consent of Kruger.
- Kruger reserves the right to use any collected data in their marketing program.
- Kruger reserves the right to bring visitors to the pilot unit throughout the course of the pilot study.



Agreement for the BIOSTYR Biological Aerated Filter Pilot Testing

Customer: Binghamton-Johnson City Joint Sewage Treatment Authority

Location: Binghamton, NY

Date of Testing: TBD

Cost of Testing: \$6,500 per week. Estimated pilot study length is 6 months. (A work month is defined as 4 work weeks, and a work week is defined as five (5), eight (8) hour days, excluding weekends and holidays). The weekly cost includes a Kruger pilot engineer onsite to operate the pilot unit Monday - Friday and the number of weeks and cost may be reduced with plant staff availability and training.

Freight Cost: \$5,000

Total Cost: The total cost of a six month pilot study will be \$174,000. This total cost could be reduced based on the need for Kruger onsite field service during the pilot.

Payment Terms: Billing to be at the completion of pilot testing with payment due net thirty (30) days.

Tax Exemption: Customer's Tax Exemption Certificate for sales tax to be included when returning the signed agreement, when applicable.

Conditions: All of the conditions as stated in the Demo Test Agreement, Pilot Study Specifications and Proposal package (Attachment A) and the attached Standard Terms and Conditions (Attachment B) are acceptable to both parties.

Agreed Upon and Accepted By:

I. Kruger Inc.
4001 Weston Parkway
Cary, NC 27513

By: _____

By: _____

Date: _____

Date: _____

P.O. # _____

I. Kruger Inc. • 4001 Weston Parkway • Cary, North Carolina 27513
Phone (919) 677-8310 • Fax (919) 677-0082



**ATTACHMENT B
TERMS AND CONDITIONS**

1. **General.** (a) At all times during the term of this Agreement the Unit shall remain the personal property of KRUGER and shall not, by accession or otherwise, become a fixture or part of the real property at the Facility. At the conclusion of the Demonstration, the CUSTOMER shall permit KRUGER access to the Facility for the time period necessary for KRUGER to remove the Unit. (b) The CUSTOMER shall procure all licenses, permits and approvals necessary to the performance of any Demonstration and shall be responsible for complying with all laws and regulations of governmental authorities and agencies affecting any such Demonstration, including without limitation, rules and regulations concerning safety and environmental matters. Notwithstanding the provisions of paragraph 1 (b) herein, KRUGER shall be responsible for any violation of law, rule or regulation caused by the Unit or KRUGER employees.
2. **Confidentiality; Ownership of Results.** All results, information, data, procedures, formulas, compilations, methods, techniques and processes, whether in writing or otherwise, relating to the Unit or any Demonstration ("Information") shall be received and maintained in confidence by the CUSTOMER, and/or any of its consultants or engineers, and shall not (with the exception of a lawful order of a court of competent jurisdiction or as required to be disclosed by CUSTOMER to any governmental agency in connection with its efforts to obtain any permits, licenses or approvals) be disclosed, directly or indirectly, by any such recipient, except to those of their employees who need to receive such information to enable the CUSTOMER to evaluate the results of any Demonstration. The CUSTOMER shall not, nor shall it permit its consultants or engineers to use or permit the use of any of such Information for any purpose other than to evaluate the results of and Demonstration. All Information, including results, data, discoveries, inventions, and improvements, whether or not patentable or copyrightable, any and all expressions of computer programs, manuals, data bases and all forms of computer hardware, firmware and software, conceived, made, first reduced to practice, or developed by either party arising out of the conduct of any Demonstration shall be the sole and exclusive intellectual property of KRUGER with respect to any and all countries, their territories and possessions.
3. **Warranty.** NO WARRANTIES, INCLUDING BUT NOT LIMITED TO, WARRANTIES REGARDING PERFORMANCE OR WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, HAVE BEEN GIVEN OR SHALL BE IMPLIED HEREIN REGARDING THE UNIT, THE INFORMATION, ANY DEMONSTRATION OR THE RESULTS OF ANY DEMONSTRATION.
4. **Indemnification.** KRUGER shall indemnify, defend and hold harmless CUSTOMER from and against any and all claims, demands, actions and causes of action, including without limitation, claims on account of personal injury, including death, or damage to or loss of tangible property of third parties to the extent caused by the negligent or other wrongful acts or omissions of KRUGER. CUSTOMER shall indemnify, defend and hold harmless KRUGER from and against any and all claims, demands, actions and causes of action, including without limitation, claims on account of personal injury, including death, or damage to or loss of tangible property of third parties to the extent caused by the negligent or other wrongful acts or omissions of CUSTOMER.
5. **Limitation of Liability.**
(a) Except for the obligation of Kruger and CUSTOMER to indemnify each other for any personal injury or third party property damage claims pursuant to paragraph 4, the aggregate liability of either party, including without limitation for or with respect to their affiliates and employees, arising out of or in connection with the Agreement, any Demonstration or the Unit, including without limitation liability based upon or arising from indemnification or contribution, breach of contract or warranty, strict liability, negligence or other tort, or any other legal or equitable theory, shall not exceed the greater of (i) the amount paid by the CUSTOMER to KRUGER for the Demonstration; or (ii) \$50,000.
(b) Notwithstanding anything to the contrary herein, in no event shall either party be liable to the other for consequential, incidental, indirect, special, exemplary or punitive damages of any kind, or for loss of profits, revenues or product, or loss of use of any property (whether by shutdown, operation at less than capacity or otherwise), regardless of whether any of the foregoing damages are based directly or indirectly upon indemnification or contribution, breach of contract, strict liability, negligence or other tort, or any other legal theory or equitable claim.
6. **General Provisions.** The Agreement, together with the Attachments thereto, represents the entire agreement between the parties with respect to the subject matter thereof, and supersedes all prior negotiations, purchase orders, representations or agreements, whether written or oral. The Agreement and these terms and conditions may not be amended except by mutual written agreement of KRUGER and the Customer. No course of performance or failure to strictly enforce any term shall be construed as a waiver thereof. Waiver of any term shall not constitute a waiver of any other term or a continuing waiver. The Agreement, including its Attachments, shall be binding on the parties' respective successors and assigns; provided that the CUSTOMER may not assign, delegate or permit any other transfer thereof without KRUGER'S prior written consent. The Agreement and its Attachments shall be governed by and construed in accordance with the laws of the State of North Carolina, without regard to its conflict of laws provisions.



